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THE EFFECT OF TEACHER BEHAVIOR ON VERBAL INTELLIGENCE IN OPERATION HEADSTART CHILDREN.

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CLASSROOM OBSERVATIONS OF 38 HEADSTART TEACHERS, TAKEN ON FOUR OCCASIONS BY FOUR DIFFERENT OBSERVERS, WERE SCORED FOR SUCH CONTENT CHARACTERISTICS AS (1) AMOUNT AND KIND OF COMMUNICATION WITH THE CHILDREN, (2) STRESS ON OBEDIENCE OR INTELLECTUAL VALUES, AND (3) PHYSICAL-MOTOR SKILLS. THESE SCORES WERE COMPARED WITH THE CHILDREN'S INTELLECTUAL GROWTH DURING THE 6-WEEK PROGRAM AS MEASURED BY THE PEABODY PICTURE VOCABULARY TEST. CHILDREN WERE FOUND TO RESPOND POSITIVELY TO TEACHERS WHO CONCENTRATED ON INTELLECTUAL ACTIVITIES, BUT SHOWED LITTLE VERBAL GROWTH IN CLASSROOMS WHERE TEACHERS STRESSED "MATERIALS AND PROPERTY." WHEN THERE WERE MANY TEACHER COMMUNICATIONS, IQ INCREASED, ALTHOUGH THOSE COMMUNICATIONS THAT WERE CORRECTIONS AND OBEDIENCE DIRECTIVES PRODUCED A SMALLER INCREASE. TEACHERS WHO WERE SCORED AS "WARM, ACTIVE, VARIED, AND FLEXIBLE" ALSO CONTRIBUTED TO IQ DEVELOPMENT. THE RESULTS SUGGEST THAT WHEN CHILDREN ARE REWARDED BY A WARM TEACHER RESPONSE THEY ADOPT THE TEACHER'S VALUES. (NC)

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The Effect of Teacher Behavior on Verbal Intelligence in Operation Headstart Children*

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In previous reports in this series evidence was presented to support the contention that pre-school enrichment had a significant positive effect on intellectual development among severely deprived children participating in Operation Headstart (Eisenberg & Conners, 1966; Waller & Conners, 1966). However, in view of the long history of debate regarding the efficacy of such intervention (Swift, 1964; Hunt, 1961), it is important to demonstrate that changes attributed to an enrichment program are determined by specific variables in the environment. Improvement in IQ, for example, should be shown to reflect not only the general exposure to a global experience, in which a large "Hawthorne" effect might prevail, but also specific variations within the program itself. It is widely believed by investigators who have examined nursery schools that the most important variable in the effectiveness of any nursery program is the personality and behavior of the teacher (Swift, 1964).

A number of studies have demonstrated that there are striking variations among nursery school teachers in behavior patterns (Reichenberg-Hackett, 1962), and certain personality characteristics (Getzels & Jackson, 1963). Relatively few studies have attempted to determine the effect of teacher behavior on intellectual changes in the children. In one major study, Thompson (1944) showed that contrasting teacher techniques had significant effects on a number of social and emotional characteristics of the children, but no effects on intellectual development. Washburne and Heil (1960) found clear evidence that the teacher's personality has a strong influence on academic progress, with self-controlled teachers getting much more academic progress than fearful teachers. These latter

results, from children in the middle grades, might be relevant to younger children. The present investigation attempts to relate a number of teacher characteristics believed to be of significance in nursery school education, to changes in measured verbal intelligence within the group of children receiving early enrichment programs in Operation Headstart. If different patterns of teacher behavior can be shown differentially to affect intellectual growth in these children in a short six-week program, clear support would be given to the importance of such programs in modifying intellectual deficits; and at the same time would help specify the most favorable type of intervention.

Method

Subjects. The teachers for this study were 32 Public School teachers and six teachers from a privately operated church nursery school, who participated in the first six-week Headstart program in Baltimore City in the summer of 1965. The sample of public school teachers consisted of the total group of teachers participating in the program in Baltimore City. All were experienced teachers in the regular system.

The demographic characteristics of the children have been fully described elsewhere (Eisenberg & Conners, 1966). Five-hundred children, comprising the total sample available in the project, were tested during the first three days of the program, and again during the last three days. The total sample was tested again one month later during the first week in regular public school. Due to absences on testing days, unusable tests due to examiner error, or dropouts from the program, scores were available for 424, 413 and 402 children for the first, second and third assessments, respectively. There were 379 children who had both the first and last tests.

Test measures. The Peabody Picture Vocabulary Test (PPVT) and the Harris-Goodenough Draw-A-Person Test (DAP) were administered in the standardized fashion described in the test monographs (Dunn, 1965; Harris, 1963). Only results from the PPVT will be considered in this report. The examiners were 90 volunteers recruited through the assistance of the local Red Cross agency. Each volunteer was first screened by the Red Cross, given a brief orientation to the program, and brief practice in administering the tests. The tests were later scored by trained assistants.

One important change in the administration of the PPVT was employed to reduce possible errors by the relatively untrained examiners: all children started with the first item in the test and continued until the ceiling was reached, whereas the child's basal level is usually derived by working backwards from a level appropriate to his chronological age. This change undoubtedly prolongs the test slightly, and may affect the final score in some unknown way, but simplifies administration.

Teacher observations. Eight observers were employed in the study. All were college students or medical students, and one was a public school teacher. The observers were given practice training with sample protocols and a non-Headstart hospital nursery school. Each public school teacher was observed by four different observers on four different days, with the observers rotated so that the same four observers never observed more than one teacher in common. All eight observers were used for each of the six private nursery teachers. (Since the latter program began later in the summer, it was possible to schedule observations in this manner).

Observers were instructed to take general notes of the entire day's activities, but they recorded a one-hour period in detail. They

were instructed to sit quietly in the classroom and not to interact with the children or teachers insofar as this was feasible. Observations were recorded as discrete episodes, in the manner suggested by Baldwin (1960) and Reichenberg-Hackett (1962). Each statement of the teacher to a child or the group was recorded verbatim. An episode was defined as a change in the triangular relationship between teacher, child, and environment, no matter how small this change might be. A change of topic, a change of teacher's attention from one child to another, or any new element of the teacher's behavior constituted such episodes.

Although each observer scored his own protocols for a number of categories, the entire set of protocols was later re-scored by two trained scorers. The scoring system was a modification of a system developed by Reichenberg-Hackett (1962). Each episode was scored for one or more of the following variables: (1) Communication (to the child, to the group, or to another adult); (2) Management (altering a child's activity in some form). If a substitute activity was provided, the episode was scored as positive management; if the behavior was simply interrupted, it was scored as negative management. (3) Encouragement (positive, rewarding or approving response of teacher to child or group in which teacher follows through with child's selected goal and material).

Groups of episodes which constituted a coherent and unified activity were identified and scored for a number of "values" on the basis of the implicit goal which these activities were judged to serve. For example, a long series of episodes might center about drawing and coloring, and the content of this "activity" might suggest that creative expression or esthetic appreciation was being fostered, and therefore this activity would be scored for "creativity." The values were:

I. Development of adequate self-concept, emotional stability, security or a sense of belonging. II. Intellectual growth (language, concept, or symbolic training; factual knowledge about the world; development of sensory abilities, etc.) III. Personal responsibility for managing private or community material or property. IV. Cultural habit training, manners, hygiene. V. Consideration for the well-being, rights and property of others. VI. Competition, achievement orientation, standards of striving and achievement. VII. Development of physical abilities, motor skills, and promotion of motor coordination. VIII. Creativity and stimulation of esthetic appreciation and imagination. IX. Obedience, self-control, following instructions.

A teacher's score on each of the variables consisted of the average of the scores from the four observers (or from all eight observers in the case of the private school). The teachers were classified as being high, medium or low on each of the characteristics on the basis of rankings of the scores for the entire group of teachers.

In addition, each observer made global judgments of the teachers on four six-point scales: warmth vs. coldness; permissiveness vs. restrictiveness; active vs. passive; and variety (imaginative, versatile) vs. non-variety (stereotype lessons).

Each teacher also completed the Minnesota Teacher Attitude Inventory (Cook, Leeds & Callis). This instrument has been widely used in educational research, and has an impressive body of validation data (Getzels & Jackson, 1963).

Results

Reliability of measurement. Two raters used sample protocols to attain inter-rater agreement after which each rater independently scored every protocol for all categories. The Spearman rank-order correlation coefficients ranged from .79 (Value IX) to .97 (Value VII), with a mean correlation of .87. The frequency of occurrence of Values V and VI was so low that they were excluded from further consideration. A long period of training with sample protocols was undertaken for the clarification of the scoring of "activities." The two scorers achieved virtually 100 per cent agreement on the definition of the activities. Since the original observers had recorded the observations in episodic form, no attempt was made to ascertain the reliability of the individual episodes with the two trained scorers. No systematic reliability data on episode definition was obtained from the observers, but the training sessions prior to the start of the observations gave the impression that observers agreed moderately well on the definition of what should be classified as an episode.

Since the same set of four observers did not observe more than one teacher, it was not possible to ascertain the consistency of teacher behavior from day to day by using all of the ratings. However, since all eight observers rated the private school teachers, an estimate of intra-teacher stability was possible for those six teachers. Inspection of the various scores indicated that the greatest variation from one observer to another in rating a teacher occurred for the global ratings. Since the four global ratings are highly intercorrelated, they were summed into an overall score which reflects "good" vs. "bad" teacher characteristics (i.e. warm, permissive, active, and varied scores were

combined to measure positively valued teacher behavior). An analysis of variance was performed on the data, with teachers constituting the "between" effects, and the eight observer scores from the private nursery constituting the "within" effects. A measure of the reliability of individual scores is then obtained by the intra-class correlation (McNemar, 1962, p. 284). The result gives a correlation of .82, which is equivalent to the average inter-correlation among all eight observers. This result suggests that combined observer scores are moderately reliable. Inasmuch as other ratings appeared by inspection to be more stable, it seems safe to assume that the other categories give scores which are moderately consistent from day to day. Subsequent analyses are all based on combined scores of the observers, and since the reliability of a combined score based on reliable components will be even more reliable, it seems reasonable to assume that the rating categories are sufficiently accurate for the subsequent analyses.

Teacher behavior and PPVT growth. For each characteristic, the teachers were classified as high, medium or low on the basis of the distribution of scores for all 38 teachers. Simple analyses of variance were performed, with the dependent variable being the PPVT change scores between the initial and final measurements. The mean changes of raw scores on the PPVT for each teacher characteristic are shown in Table 1.

Table 1 about here

Individual comparisons between high, medium, and low teachers, using t-tests based on the mean-square from the analyses of variance, are shown in Table 2.

Table 2 about here

The results may be summarized as follows: (1) Teachers high on communication produce significantly more positive change in PPVT scores than teachers with a moderate degree of communication; (2) Teachers high on communication to individuals produce significantly less IQ growth than medium or low teachers; (3) teachers high on communications to the group produce significantly more improvement than medium teachers; (4) Teachers high on encouragement produce significantly less improvement than teachers with moderate amounts of encouragement; (5) Management does not affect the change scores, although if change is measured from the 1st to the 2nd testing, teachers high on management produce significantly less growth than medium or low management teachers ($p < .05$); (6) Teachers who moderately value self-confidence and self-concept improvement in the children produce significantly more growth than those who place a high degree of emphasis on this value; (7) Teachers who highly value intellectual activity produce significantly more growth in IQ than medium or low teachers. This result is one of the strongest of all the comparisons, and shows a direct increase in PPVT scores with increasing amount of intellectual activity by the teacher ($p < .005$). (8) Teachers who place a high value on property rights and care of materials produce significantly less growth than teachers who are medium or low on this value. This unexpected finding is also a highly significant effect ($p < .001$). (9) Values regarding manners and hygiene, rights of others, physical-motor skills, and esthetic appreciation are not significantly related to PPVT changes. (10) Teachers rated as warm, active, permissive

and varied in their activities (as determined by an overall score based on the sum of four six-point scales), produce more growth than teachers rated low on these characteristics. (11) Teacher attitudes, as measured by the MTAI do not correlate significantly with PPVT changes in the children.

Intercorrelations among measures. Table 3 presents rank-order intercorrelations among the various measures which help to clarify the meanings of some of the rating categories. Intellectual activity on the

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Table 3 about here

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part of teachers appears to be moderately correlated with communication, management and obedience, and negatively correlated with manners and hygiene, and emphasis on property rights or responsibility for materials. Management correlates moderately with the MTAI, suggesting that it reflects the positive, non-authoritarian orientation which the MTAI was designed to measure. It is interesting to note that encouraging teachers tend to be rated by the observers as warm, varied, etc. on the global ratings; but whereas the global ratings affect IQ growth significantly, too much encouragement adversely affects IQ growth. The pattern of relationships appears to indicate that a high degree of communication and intellectual activity, together with a moderate degree of management and encouragement, is optimal for producing increases in verbal IQ scores.

Discussion

The two clearest findings from this study are that teachers who place a high value on intellectual activity produce significantly more PPVT growth than those who do not value such activities; and that teachers

who place an emphasis on the care of property and the materials in the classroom produce significantly less growth in verbal intelligence. In a further effort to specify the nature of the activity which is effective in producing change, the teacher's intellectual activity in the classroom was scored for three subcategories: emphasis on language, convergent reasoning, and divergent reasoning. Convergent reasoning involves teacher behavior in which specific, factual answers are asked for from the children, while divergent reasoning emphasizes a more productive, exploratory response from the child (e.g. a convergent stimulus might be "Mary, how many wheels does a truck have?", while a divergent stimulus might be, "Mary, tell me all the things that a truck is good for."

The results of subanalyses did not show any effect of these more specific categories on the PPVT scores. It may be the total pattern of intellectual stimulation, rather than any specific adherence to language training per se, or to different patterns of questioning, that is required to induce growth. There might well be other specific aspects of the teacher's intellectual activity which are optimal for inducing verbal growth, but it seems unlikely that the changes found in this study can be accounted for simply by specific language instruction or coaching. If the latter were the case then one would have expected the language subcategory to be highly related to the measured changes, which it is not.

The strong negative effect of the "materials and property" orientation suggests that teachers who are concerned with maintaining neatness, order, and a pristine inviolacy of classroom facilities somehow manage to be less effective in fostering intellectual growth. It is interesting that this value is negatively correlated with intellectual activity (rho = -.13) and rather strongly correlated with emphasis on

manners, hygiene and conventional behavior (rho = .41). The negative effect of this value orientation might stem from the fact that teachers who are concerned about such matters simply have less time for carrying out an effective intellectual lesson.

There appears to be a particularly deleterious effect on PPVT growth where the teacher places a high emphasis on property and materials, while at the same time placing little emphasis on intellectual activity. The striking effect of this "personality type" is seen in Table 4, where

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Table 4 about here

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it may be noted that the property/materials orientation has no effect on the high intellectual activity teachers' ability to induce growth; but that among the low intellectual activity teachers, a high property/materials orientation produces no IQ growth at all. The overall differences between the four groups of teachers (high-high, high-low, low-high, and low-low) are highly significant ($p < .001$). Apparently then, a high degree of lesson-oriented behavior from the teacher also allows her to teach responsibility for neatness and order without detracting from her effectiveness in the intellectual domain; but in classrooms where there is little lesson activity, the focus on neatness and order is associated with no growth whatsoever. Presumably, a teacher who does not have a great deal of lesson-oriented behavior, but who does not spend her time exclusively emphasizing the care of materials may, by other routes, achieve a satisfactory increase in measured verbal intelligence.

Communication is also an important factor in PPVT growth, but while a high degree of communication produces the most improvement, it

is noteworthy that a high degree of communication to individuals is less effective than a moderate degree of communication to individuals. This result may be interpreted as reflecting the fact that a good deal of the individual communications are likely to reflect correction or punishment for deviance, while the group communications are more likely to reflect lesson-oriented teacher behavior. It is not surprising therefore that although overall communication is significantly correlated with intellectual activity (rho = .48), 9 of the 12 high-communication teachers were also high on value IX, obedience.

The question might reasonably be asked as to whether a high degree of teacher orientation toward intellectual values is a sufficient condition for the stimulation of language and intellectual development; or whether other values are crucial in the process as well. It seems unlikely that a cognitively active teacher who is cold and distant from the children will necessarily influence their progress more than a warm, flexible teacher who maintains a positive relationship with them and seduces them into learning by sheer force of charisma, even though apparently indulging in very little explicit intellectual activity. In some respects such a distinction characterizes the long history of debate about the underlying philosophy of education which is appropriate at this level. However, our own predilection would be to consider that neither warmth nor intellectual lessons by themselves are sufficient. Some support is gained for this notion from the data. When the PPVT changes of high and low intellectually oriented teachers are considered, it is the teachers who are also high on the global ratings of warmth, etc., who produce the most change; while high intellectual teachers who are low on warmth produce about the same amount of change as low intellectual teachers ($p < .10$ by analysis of variance).

Bandura and Huston (1961) showed that nurturant models produced more imitation in nursery children than non-nurturant models, and Hartup (1958) and Rosenblith (1959) have shown that nurturance affects the degree of success a child has in learning tasks where the adult model provides cues that can be utilized in the child's problem solving. It would appear, therefore, that warmth and nurturance may be the vehicle for engaging imitative behavior on the part of the child; and that where the model also employs intellectual behaviors, these will be adopted by the child as a part of the modeled behavior. Clearly, then, neither warmth nor a strict lesson orientation by themselves should be expected to facilitate intellectual and adaptive growth in children.

Pauline Sears (1963) has noted that language and intellectual development may be affected by nursery school, particularly if the home or non-school environment is meager in stimulating qualities. One might not expect the same amount of teacher effect on verbal intelligence tests among middle class children who have much less to gain in this area, although they may profit in other areas such as social and emotional development. This study has confined itself to the single dependent variable of changes in performance on a verbal intelligence test, but it seems reasonable to expect that severely culturally deprived children will be differentially affected by teacher behaviors in a number of other areas as well. It is not surprising that emphasis on physical-motor skills, or social responsibility have little bearing on changes in verbal IQ scores; but they might well affect non-cognitive variables which are of importance to the child's further development.

There seems little justification for an extreme nativistic or pre-formationist point of view where intelligence is concerned, given

the findings of this paper. It might be argued, of course, that we have not truly measured "intelligence" at all; and that the changes merely reflect a superficial heightening of verbal facility which can have little importance to further development. The argument that this is not intelligence, but something else, hinges on the definition of intelligence, and in point of fact the measure used in this study has often served as one operational definition of that concept. If, on the other hand, the argument is meant to imply that such measures are mistakenly labeled intelligence tests because intelligence is something fixed, innate or predetermined by inheritance, then we can only disagree with such a conception of intelligence, which would ignore the fact that all development tends to be epigenetic and conditional upon the constant transaction of the biologically given with the environment.

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Table 1

Mean Changes in PPVT Raw Scores for Teachers Classified as High. Medium or Low for Various Characteristics

RATING CATEGORY	High	Med	Low	F	P
For episodes					
Communication (total)	9.17	5.83	6.65	4.43	<.025
" (individual)	4.92	8.10	7.87	3.56	<.05
" (group)	8.97	5.51	7.45	4.62	<.025
Encouragement	5.68	8.27	7.20	2.19	<.20
Management	6.21	7.88	7.34		n.s.
For activities (Values)					
I. Self Concept	5.96	8.36	7.21	2.35	<.20
II. Intellectual	9.38	7.06	4.89	6.04	<.005
III. Property & materials	3.26	8.33	8.97	12.10	<.001
IV. Manners	6.73	6.10	8.35	2.03	<.20
V. Rights of others	6.25	7.74	7.29	0.52	n.s.
VII. Physical-Motor	8.16	6.14	7.59	1.47	n.s.
VIII. Creativity	6.80	7.60	6.97	.24	n.s.
IX. Obedience	7.31	8.16	5.93	1.67	n.s.
MTAI	7.29	7.34	6.25	0.48	n.s.
Global Ratings	8.93	7.37	5.58	3.52	<.05

Table 2

Mean Comparisons between Teachers who are High, Medium or Low on Various Characteristics

		MEAN COMPARISONS		
For Episodes		Hi vs. Med.	Hi vs. Lo	Med. vs. Lo
Communication (Total)	d	3.34	2.52	1.70
	S.E.	1.15	1.32	1.28
	t	2.91***	1.92	1.33
Communication (Individ)	d	3.18	2.95	.23
	S.E.	1.33	1.25	1.17
	t	2.40*	2.35*	.20
Communication (Group)	d	3.46	1.52	1.94
	S.E.	1.14	1.32	1.28
	t	3.02***	1.16	1.52
Encouragement	d	2.59	1.52	1.07
	S.E.	1.24	1.29	1.18
	t	2.09*	1.18	.90
Management	d	3.11	2.83	.28
	S.E.	1.23	1.37	1.29
	t	2.53**	2.06*	.22
For Activities (Values)				
I. Self-Concept	d	2.40	1.25	1.15
	S.E.	1.19	1.28	1.24
	t	2.02*	.97	.93
II. Intellectual	d	2.32	4.49	2.17
	S.E.	1.17	1.30	1.23
	t	1.98*	3.46***	1.77
III. Personal Responsib. for Property	d	5.07	5.71	.64
	S.E.	1.24	1.24	1.14
	t	4.10***	4.59***	.56

Table 2 cont'd.

		Hi vs. Med.	Hi vs. Lo	Med. vs. Lo
IV. Manners	d	.63	1.62	2.25
	S.E.	1.33	1.28	1.15
	t	.47	1.26	1.95
V. Rights of Others	d	1.49	1.04	.45
	S.E.	1.49	1.30	1.20
	t	1.00	.80	.37
VII. Physical Motor	d	2.02	.57	1.45
	S.E.	1.24	1.28	1.18
	t	1.62	.44	1.23
VIII. Creativity	d	.80	.17	.63
	S.E.	1.29	1.33	1.16
	t	.62	.13	.54
IX. Obedience	d	.85	1.38	2.23
	S.E.	1.26	1.31	1.28
	t	.67	1.06	1.74
MTAI	d	.05	1.04	1.09
	S.E.	1.25	1.36	1.28
	t	.40	.76	.85
Global Ratings	d	1.56	3.35	1.79
	S.E.	1.24	1.31	1.34
	t	1.25	2.55**	1.34

* p <.05
** p <.02
*** p <.01

Table 3

Rank Order Correlation Among Experimental Measures

	MGMT	ENC.	GLOBAL	I	II	III	IV	VII	VIII	IX	MTAI
COMMUNICATION	.60	.32	+.25	.27	.48	.18	-.01	.12	.11	.05	.03
MANAGEMENT		-.24	-.03	.06	.56	-.08	-.17	.10	.15	.06	.42
ENCOURAGEMENT			+.75	.07	-.08	.43	.19	.27	.07	-.15	-.28
GLOBAL (Hi Score = Good Rating)				+.02	+.10	+.25	+.16	+.15	+.09	-.32	.02
VALUE I (Self-Concept)					.20	.15	-.04	-.08	-.05	.07	-.14
VALUE II (Intellectual Growth)						-.13	-.27	-.03	.19	.36	.03
VALUE III (Personal Respon.)							.41	.17	.02	.09	-.02
VALUE IV (Manners)								.17	-.11	.06	.06
VALUE VII (Motor Skills)									.57	.04	.11
VALUE VIII (Creativity)										-.02	.18
VALUE IX (Obedience)											-.33
MTAI											

Note: Underlined values are statistically significant beyond the .05 level (two-tail test).

Table 4

Mean Changes in PPVT Scores for Teachers Classified by Intellectual Activity and Emphasis on Property or Materials (Value III)

	Intellectual Activity			
	Low		High	
	Value III			
	Low	High	Low	High
Mean PPVT Change	9.30	0.02	9.40	8.89
N	30	44	57	28

$F = 9.85.\ p < .001$ (df 3, 155)

Summary

Thirty-eight teachers in Operation Headstart were observed on four separate occasions by four different observers who recorded in detail the teachers' behavior. These protocols were scored for a number of characteristics which served as a basis for classifying teachers into different categories in such areas as the amount and type of communication to the children, emphasis on intellectual values or obedience, physical-motor skills, etc. These measures were then compared with the amount of intellectual growth shown by the children during the six-week program, using the Peabody Picture Vocabulary Test as a measure of growth. Intellectual activity by the teacher strongly influenced the growth of the children in a positive fashion, while emphasis on materials and property in the classroom tended to produce little growth in verbal IQ. Teacher communications also affected Peabody changes, with many communications to the group producing growth. A high number of communications to individual children was found to consist mainly of corrections and insistence on obedience, and consequently to produce significantly less intellectual growth. Teachers who were rated as warm, varied, active and flexible also tended to produce most IQ improvement. The results are interpreted as reflecting a modeling process in which children adopt the content of the teacher's behavior, such as her value on intellectual behavior, as a result of being rewarded with a warm and nurturant response by the teacher.